INSTRUCTION MANUAL

SERIES 5600
Formerly PP
POLARIZATION POSITIONER

SCIENTIFIC-ATLANTA, INC.

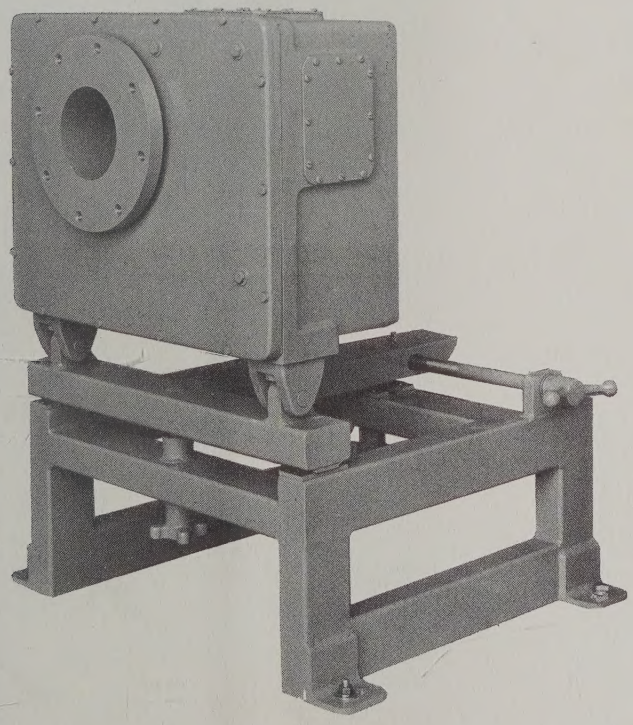
When ordering parts from Scientific-Atlanta, Inc., be sure to include the equipment model number, equipment serial number, and a description of the part.

MODEL NO. 5613-S1-R/81460

SERIAL NO. 230

INSTRUCTION MANUAL

SERIES 5600
Formerly PP
POLARIZATION POSITIONER



MODEL 5613 POSITIONER ON
A MODEL 5673 FIXTURE

First Edition
June 1963

Price $1

MODIFICATION NOTICE

MODEL 5613-S1-R/81460 POLARIZATION POSITIONER, SERIAL NO. 230

This positioner has been modified from the standard unit described in this instruction manual. The modification consists of the addition of a photoelectric limit sensor subassembly mounted to the rear of the positioner. This limit subassembly contains four independent limit sensors. Each sensor consists of a photo-silicon controlled rectifier (PSCR), a light-chopper disc, and a light source. One hole in the light-chopper disc, when lined up with the light source and PSCR, permits light to shine on the PSCR. As light strikes the PSCR, it conducts and remains latched on even after the light has been removed. A relay in an external, customer-supplied control panel is connected in series with each PSCR through a switch so that when the PSCR conducts, the relay is pulled in.

Each light-chopper disc is individually adjustable on its shaft so that the limit points can be changed. To adjust a disc, remove the cover and loosen the set screws nearest the disc (there are three per disc). Rotate the disc as required. See Dwg. B52152 at the back of this manual for a layout of the PSCR's and light-chopper discs.

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INSTRUCTION MANUAL
CHANGE NOTICE

SERIES 5600, FIRST EDITION, JUNE 1963

To make this manual apply to your instrument, make the manual changes shown below.

Instrument Serial No.	Change
All	Errata
See Below	1

Instrument Serial No.	Change

Errata: On page 1-2, the limit-to-limit travel of Model 5601 should be 90°. On page 5-2, the connector part no. should be "MS3102A-28-11P(Z)." On page 5-4, the drive motor manufacturer should be "SU." On pages 5-4, 5-7, and the schematic diagram for Models 5612 and 5622 on page 5-10, the suffix "(Z)" should be added to the connector part no's.

Change 1: Synchro wiring changes have been made in the following units:

Model	Serial No.
5601	23 and above
5611	37 and above
5612	38 and above
5613	91 and above

Model	Serial No.
5621	17 and above
5622	16 and above
5623	59 and above

Therefore, make the following changes to the schematic diagrams on pages 5-9 and 5-10:

MODEL 5613 AND 5623 SCHEMATIC

Connector Pin	Is Now Connected To
S	S1, 36:1
R	S3, 36:1
T	S2, 36:1 and 1:1
U	S1, 1:1
V	S3, 1:1

MODEL 5601 SCHEMATIC

Connector Pin	Is Now Connected To
U	S1
T	S2
V	S3

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SECTION 1
GENERAL DESCRIPTION

1.1 Introduction

Scientific-Atlanta Series 5600 Polarization Positioners are used generally to rotate antennas to change polarization and specifically for such applications as crosspolarization and polarization pattern measurements.

The housings of the Series 5600 Positioners are cast aluminum and the entire mechanism of each positioner is completely sealed against moisture, dust, and adverse weather. The drive-shaft is hollow to permit the passage of RF equipment and plumbing (for shaft "center-hole" size, see Table 1.1). Rotary joints and waveguides with special flanges for insertion through the hollow drive shaft are available.

Scientific-Atlanta Series 5670 and Series 5680 Mounting Fixtures are available for the Series 5600 Polarization Positioners. The adjustable mounting fixtures allow azimuth and elevation "squint" adjustments over a ±5° sector.

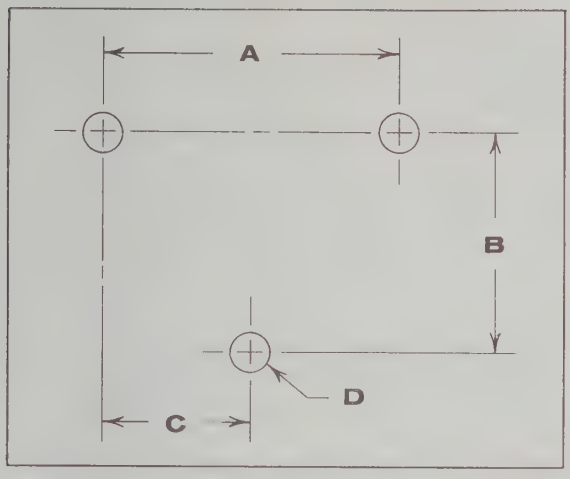
The Series 5600 Polarization Positioners are available in manually operated, constant-speed motor-driven, and variable-speed motor-driven models.

Scientific-Atlanta precision synchro transmitter units can be installed in the Polarization Positioner to provide 1:1 and/or 36:1 output signals for remote position indication and recorder chart control (Model 5601 will accept a 1:1 synchro transmitter only).

Adjustable rotary limit-switches are standard equipment on Models 5612 and 5622 and optional equipment on Models 5601, 5613, and 5623.

CHARACTERISTICS		SERIES 5610			SERIES 5620		
	Model 5601	Model 5611	Model 5612	Model 5613	Model 5621	Model 5622	Model 5623
Maximum Recommended Antenna Diameter (ft)	3	8	8	8	16	16	16
Maximum Vertical Load (lbs)	400	1000	1000	1000	3000	3000	3000
Maximum Bending Moment about Mounting Flange (ft-lbs)	400	1000	1000	3000	3000	3000	3000
Turntable Diameter (in)	8	8	8	8	16	16	16
Center Hole Diameter (in)	2	3-3/4	3-3/4	3-3/4	4-3/4	4-3/4	4-3/4
Drive Motor Type and Horsepower	Synchronous ac 1/100	--	Synchronous ac 1/100	dc 1/15	--	Synchronous ac 1/56	dc 1/3
Maximum Full Load Operating Speed (rpm)	3.3	--	0.8	3.6	--	0.4	1.1
Delivered Torque (ft-lbs)	9	--	35	45	--	130	430
Withstand Torque (ft-lbs)	13	--	260	260	--	600	600
Readout Position Accuracy (deg)	0.5	--	0.5	0.05	--	0.5	0.05
Maximum Total Drive Gear Backlash (deg)	1.0	--	0.2	0.2	--	0.2	0.2
Rotary Limit Switches	Optional	--	Installed	Optional	--	Installed	Optional
Limit-to-Limit Rotation with Limit Switches	270°	Detents Every 45°	90°	368°	Detents Every 45°	90°	400°
Recommended Control Unit	4101	--	4102	4111 or 4112	--	4102	4111 or 4112
Recommended Control Cable	5051-5	--	5051-5	5051-8 or 5051-12	--	5051-5	5051-8 or 5051-12
Fixed Horizontal Mounting Dimensions (in)							
Height	9-1/8	13-5/8	13-5/8	13-5/8	18-3/4	18-3/4	18-3/4
Width	15	17	17	17	27	27	27
Depth	8-1/4	10	10	10	16	16	16
Net Weight (lbs)	35	50	60	72	100	160	170

Table 1.1



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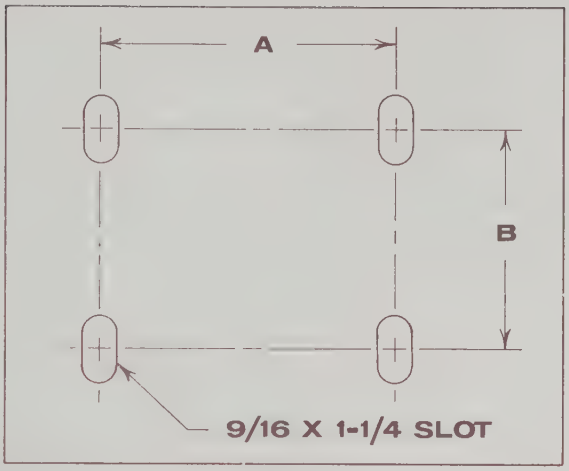

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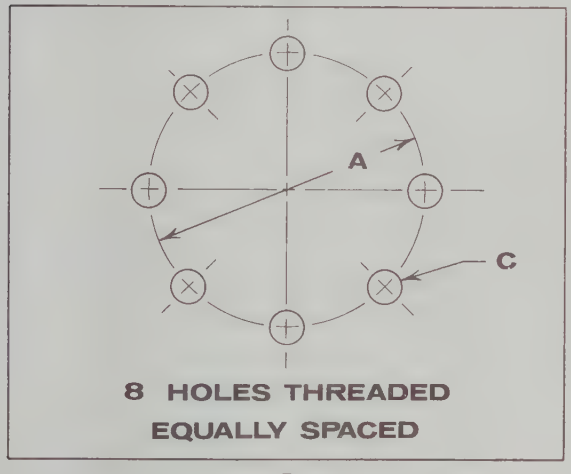

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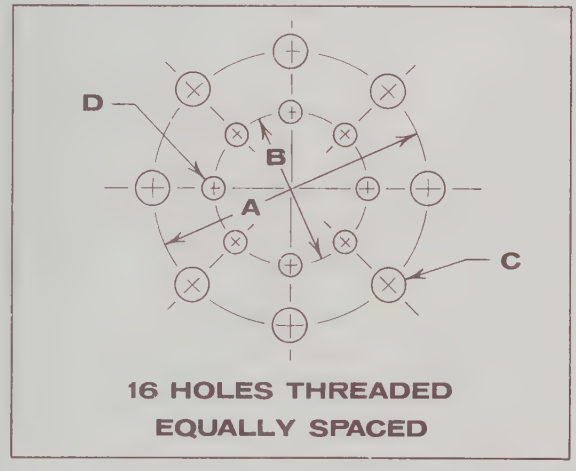


4

MODEL POSITIONER	Base Mounting Data					Turntable/Platform Data				
	Ref. Pat.	A	B	C	D	Ref. Pat.	A	B	C	D
5601	1	7-3/16	13-15/16	3-19/32	3/8	3	7-1/16	--	3/8-16	--
5611	1	19-1/8	7-1/4	9-9/16	17/32	3	7-1/16	--	3/8-16	--
5612	1	19-1/8	7-1/4	9-9/16	17/32	3	7-1/16	--	3/8-16	--
5613	1	19-1/8	7-1/4	9-9/16	17/32	3	7-1/16	--	3/8-16	--
5621	1	25	12	12-1/2	17/32	4	12	7-1/16	1/2-13	3/8-16
5622	1	25	12	12-1/2	17/32	4	12	7-1/16	1/2-13	3/8-16
5623	1	25	12	12-1/2	17/32	4	12	7-1/16	1/2-13	3/8-16
5673	2	20	15-1/2	--	Ref. Pat.	--	--	--	--	--
5671	2	20	16	--	Ref. Pat.	--	--	--	--	--
5672	2	19-1/8	16	--	Ref. Pat.	--	--	--	--	--
5681 (Hor.)	1	27	20-1/8	13-1/2	9/16 slot	--	--	--	--	--
5682 (Hor.)	1	27	20-1/8	13-1/2	9/16 slot	--	--	--	--	--
5681 (Vert.)	2	27	26	--	Ref. Pat.	--	--	--	--	--
5682 (Vert.)	2	27	26	--	Ref. Pat.	--	--	--	--	--

Table 1.2

SECTION 2
INSTALLATION

The Series 5600 Polarization Positioners are ready for installation and operation when received. If a mounting fixture has been ordered, the positioner and fixture will be shipped assembled.

As a precaution, the unit should be checked for shipping damage, and the oil level checked in the speed-reducer gear box, if applicable. (see paragraph 4.2.1, Section 4.)

CAUTION

It is recommended that Series 5600 Polarization Positioners be mounted only in the upright position (as shown on the frontispiece of this manual). This is necessary to properly orient a moisture-drain hole in the housing and a pressure-vent plug in the speed reducer. If a special mounting position is specified at the time of ordering, the drain hole and vent plug are relocated.

SECTION 3
DETAILED DESCRIPTION

3.1 Positioner

3.1.1 Construction

The turntable drive shaft is a machined aluminum casting which allows the passage of RF cables or the mounting of a coaxial rotary joint (see paragraph 3.3.4). The drive shaft in each positioner is supported by precision ball bearings at each end. Dust seals, which are concentric to the drive shaft, protect the bearings and internal mechanism from moisture, dust, and adverse weather. At the front end of the drive shaft and integral with it is a flange (turntable) which contains threaded inserts for mounting the antenna. The placement and size of these bolt holes is shown for each model positioner in Table 1.2 (page 1-3).

3.1.2 Drive Motor

The Model 5601 Positioner employs a reversible, constant-speed motor with a planetary gear head. This motor operates the drive shaft through a 1:1 gear train.

Models 5611 and 5621 Positioners are manually operated. They may be rotated continuously; a mechanical detent is provided for indexing the rotation at each 45°.

Models 5612 and 5622 are equipped with a constant-speed, reversible, synchronous motor, which operates through a speed reducer to turn the polarization drive shaft. Polarization rotation is limited to 90° by precision rotary limit-switches to ensure close control of vertical and horizontal polarization.

Models 5613 and 5623 utilize the same type of speed reduction operated by a variable-speed dc drive motor which provides continuous, reversible rotation. Rotary limit-switch assemblies are optional for Models 5613 and 5623.

3.2 Mounting Fixtures

There are three mounting fixtures available for the Series 5610 Positioners. The Model 5671 Fixture is for mounting to a vertical surface and is adjustable, the Model

5672 Fixture also mounts vertical, but does not provide adjustment, and the Model 5673 Fixture is for mounting to a horizontal surface and is adjustable.

The Model 5681 and Model 5682 Mounting Fixtures are available for the Series 5620 Positioners. They are adjustable and will mount to a vertical or horizontal surface. The adjustments of the Model 5682 Fixture (linear actuator) are motor driven.

Base mounting data is shown in Table 1.2 (page 1-3).

3.3 Electrical

A schematic diagram for each model positioner appears at the rear of this manual.

3.3.1 Drive Motor

Models 5601, 5612, and 5622 Positioners are driven by a permanent-magnet, synchronous, 120v, 50/60-cps ac motor. A phase-shifting network, comprising C1 and R1, is used to operate the motor from a single-phase 120v source. The motor is reversed by energizing one motor winding or the other, causing leading or lagging currents to flow in one of the coils. The phase-shifting network is integral with the motor in the Model 5612 and is located external to the motor in Models 5601 and 5622.

Models 5613 and 5623 Positioners are driven by a variable-speed reversible dc motor. The speed is varied by applying from 0 to 125 volts dc to the armature while supplying 105 volts dc to the shunt field. Reversing is accomplished by changing the polarity of the armature supply voltage.

3.3.2 Rotary Limit-Switches

Internal, adjustable, rotary limit-switches are installed on Model 5612 and Model 5622 Positioners; they are optional on Models 5601, 5613, and 5623. Where limit switches are installed, both clockwise and counterclockwise rotation limits can be set by adjusting the limit-switch cams as described in the General Electric publication following Section 4 of this manual. The optional limit-switches on the Model 5601 are set at the factory for rotation limits in either direction in increments of 90°. They are not adjustable.

Access to the rotary limit-switches is afforded by removing the small cover plate on the rear of the housing.

3.3.3 Synchro Transmitter

Scientific-Atlanta synchro transmitters are optional items and may be installed within the Series 5600 Positioners to provide position-information signals for remote position-indication and recorder chart control. The synchro unit is driven from the drive gear by a spring-loaded antibacklash gear.

The three synchro transmitter units available provide ratios of 1:1, 36:1, or 1:1 and 36:1 position-information signals.

The Model 5601 can have a 1:1 synchro transmitter only.

A synchro sheet, following Section 4 of this manual, is provided to describe correct electrical zero.

3.3.4 Coaxial Rotary Joint

The Scientific-Atlanta Coaxial Rotary Joint is an optional item and can be supplied with any of the Series 5600 Positioners. The rotary joint is installed at the rear of the hollow drive shaft and is secured to the housing by a bracket. Care must be exercised when making connections to the joint so that off-axis strains are not imposed on the joint.

SECTION 4
MAINTENANCE

4.1 General

The Series 5600 Positioners will operate under normal service conditions for periods of five years between major overhauls when properly maintained.

To ensure full service life and efficient operation of the positioner the following service functions should be performed every 500 hours of operating life, or every 6 months, whichever occurs first.

4.1.1 Drive Motor

The motor bearings are permanently lubricated and should only require lubrication at major overhaul. Periodic inspection of the brushes and commutator of dc motors should be made. Replace the brushes on these motors when they are worn to 1/4 inch.

4.1.2 Drive Belt

The drive belt should be replaced when noticeably worn or frayed. The belt may be removed and a new one installed by loosening the 4 bolts that hold the motor down and moving the motor toward the reducer to obtain slack in the belt. When tension on the belt is correct it will deflect from 1/4 to 1/2 inch under moderate thumb pressure at mid-span. Do not tighten the belt excessively. Care must also be taken not to kink the belt prior to or during installation.

The Model 5612 has a rollerless chain in place of the drive belt.

4.2 Lubrication

4.2.1 Speed-Reducer Gear Box

The speed-reducer lubricant should be changed at 6-month intervals, the ambient temperature determining the viscosity. The lubricant level should be checked periodically.

Access to the reducer gear box may be obtained by removing the two large cover plates on the housing.

Models 5622 and 5623 have a drain pipe. The level check plug is located behind the drive pulley and the fill plug is the uppermost plug on the reducer. The oil capacity is 3/4 pint.

On Models 5612 and 5613 the fill plug will be the uppermost plug, the level check plug the center plug, and the drain plug the lower plug. The oil capacity is 1/4 pint.

The following lubricants are recommended.

Temperature over 40°F:	Esso Pen-O-Led #6
Temperature 40°F to 0°F:	Esso Pen-O-Led #2
Temperature below 0°F:	One part kerosene to 4 parts Esso Pen-O-Led #2

Should the operator desire to use a different lubricant, the Pen-O-Led should be drained and the reducer flushed out with kerosene.

4.2.2 Bearings and Drive Gears

Every three months the bearings and drive gears should be lubricated with Texaco Regal Starfax No. 2, Gulf XX Lubricant No. 1, or equivalent. Access to the speed reducer, bearings, and drive gears can be obtained by removing the housing as described in paragraph 4.3.

4.3 Housing Removal

4.3.1 Model 5601

To open the Model 5601, the bottom plate must be removed as follows: Rest the positioner on its turntable. Remove the bolts holding the bottom plate to the housing and gently tap the bottom plate evenly around its edge to separate the housing and plate. The lower turntable-shaft bearing is seated in the plate, therefore, care must be taken not to tilt the plate during removal. The plate is replaced in the reverse order, making sure not to force the turntable-shaft bearing.

4.3.2 Models 5611, 5612, and 5613

On the 5610 Series, the locking collar and lock nut on the rear of the drive shaft must be removed before the housing can be taken off. A spanner wrench can be used to remove the locking collar and lock nut. Remove the screws holding the electrical connector mounting plate and let the plate and connector fall inside the housing. Remove the bolts securing the cover to the housing. Turn the positioner so that it rests on the turntable, and pry up gently with a screwdriver in several places between the cover and housing. Grasp the housing in both hands and pull straight up, being careful not to damage the threads on the drive shaft. Replace the housing in reverse order. Do not tighten the locking collar too much. A snug fit is sufficient. Remount the electrical connector by reaching inside the housing with a pair of long-nose pliers and moving the connector mounting plate into the proper position, replace the screws.

CAUTION

Do not force the rear bearing. The bearing should be snug on the shaft; careful tightening of the locking collar will facilitate replacement.

Make sure that all gaskets and dust seals are reinstalled properly before placing the positioner in use.

4.3.3 Models 5621, 5622, and 5623

On the 5620 Series, the locking lug on the rear of the drive shaft must be forced out of position before the lock nut and collar can be removed. The rest of the disassembly is the same as that for the 5610 Series. During reassembly, carefully tighten the locking lug ring and the lock nut against the collar without excessive pressure. Bend one lug into position to secure the nut.

CR9441-E
ROTATING LIMIT SWITCH

The CR9441-E rotating-type limit switches are designed to co-ordinate reversing operations with the number of revolutions of a motor shaft or the rotation of driven equipment. Typical applications include control of limits of travel on machinery, opening and closing of doors and windows, and operation of valves on machine tools. The internal construction features shown in Fig. 1 are the same for all forms of this switch. The die-cast, general-purpose enclosure pictured in Fig. 1 and 4 is used with the E1 and E4 forms. Refer to outline, Fig. 5, for details of enclosures for watertight forms E2 and E5, and explosion-proof forms E3 and E6.

DESCRIPTION

The operating mechanism consists of cams A and B, carried on cam support E, and driven by shaft O through gears C and D.

Cams A and B operate the contacts of the two switch units F and G by depressing plungers J. Cam rider H separates cam and plunger to prevent binding. Limit switch forms E1, E2, and E3 have snap-action switch units with contact sequence as shown in Fig. 2. Slow-make-and-break switch units as used with forms E4, E5, and E6 have the contact sequence of Fig. 3.

Interruption ratings differ for the two types of switch units. As noted in Table I, d-c ratings apply only to forms E1, E2 and E3, having snap-action units, as slow-make-and-break units used with forms E4, E5, and E6 are not recommended for d-c duty. A-c ratings are the same for all forms, except that two-circuit ratings do not apply to switch units having provision for only a single circuit.

INSTALLATION

Refer to outline drawings, Fig. 4 and 5 for location of mounting holes. General dimensions shown on these outlines are correct for all forms of these switches, although certain shaft sizes may differ. The limit switch can be mounted in any position. Wiring is brought into the switch in conduit P through the ¾-inch pipe tap, and the switch wired as shown in Fig. 1. Insulation pieces M are folded over the switch units before the cover is replaced.

ADJUSTMENT

The operating mechanism should be adjusted to correlate with the motion of the equipment to which the limit switch is coupled, within the limitations given in Table III.

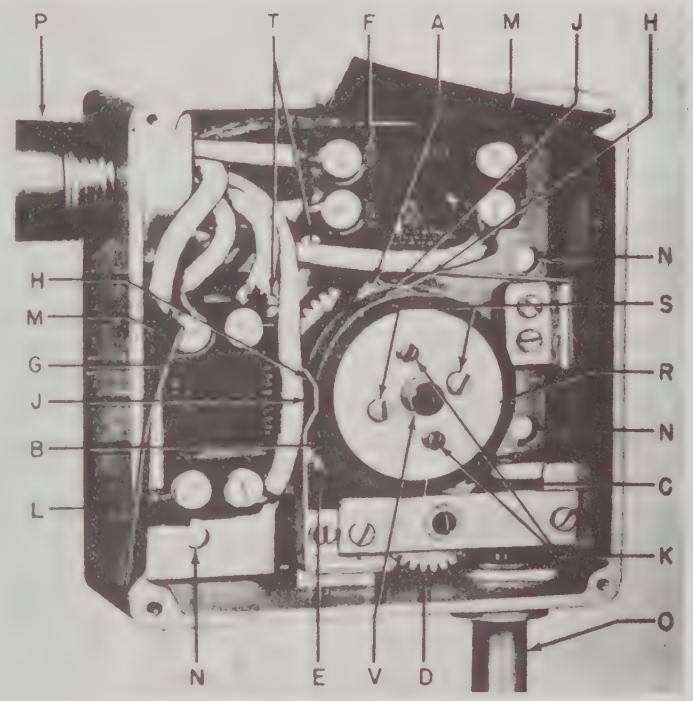


Fig. 1. Interior view of CR9441-E limit switch

To adjust the cams, first loosen the clamping plate R by loosening the clamping screws S. This unclamps the cams A and B from the cam support E. Then after the clamping screws are loosened, the adjusting screws K can be turned. Each of these screws rotates one of the cams, and permits adjustment relative to the cam support and to the other cam. When adjustment is complete, the clamping screws S should be tightened so that the clamping plate R firmly holds the cams.

MAINTENANCE

Gears are lubricated at the factory and require no further attention. The drive shaft and gears have self-lubricating bearings. The molded cams have natural lubricating qualities, and the switch units should not be lubricated.

If replacement of a switch unit is necessary, screws T should be removed, allowing the unit to be withdrawn from the enclosure.

RENEWAL PARTS

New switch units can be ordered from the nearest General Electric Sales Office. Specify the quantity wanted, and give the complete CR number appearing on the limit switch nameplate.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.

GENERAL PURPOSE CONTROL DEPARTMENT, GENERAL ELECTRIC COMPANY, BLOOMINGTON, ILL.

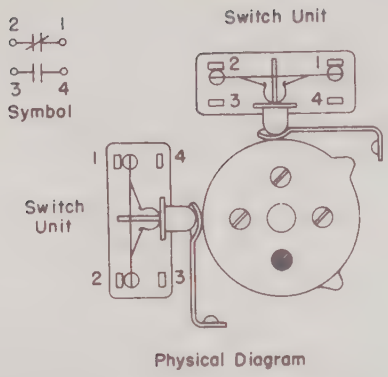


Fig. 2. Contact sequence of CR9441-E1, -E2, -E3 limit switches

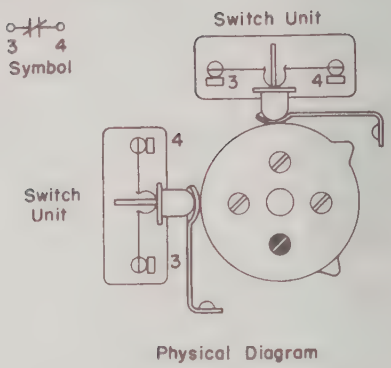


Fig. 3. Contact sequence of CR9441-E4, -E5, -E6 limit switches

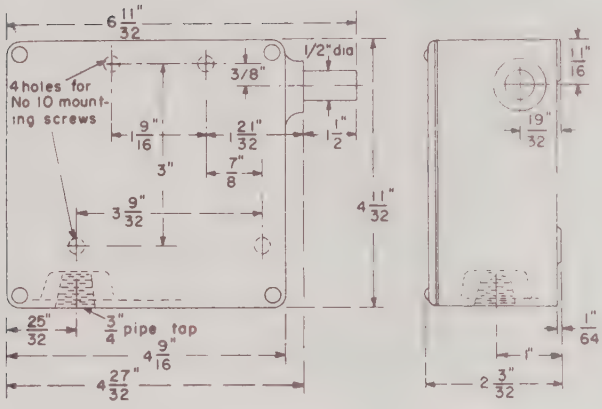
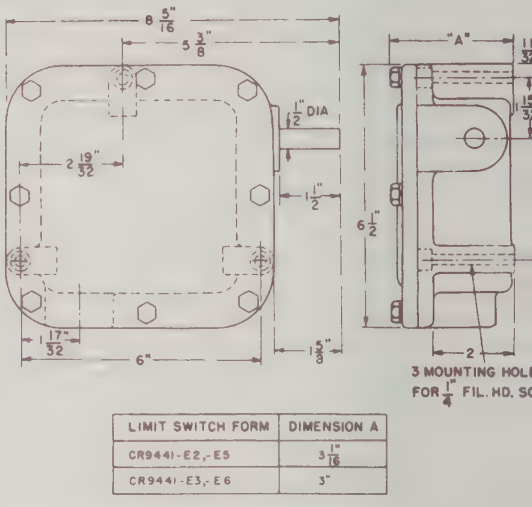


Fig. 4. Outline drawing of CR9441-E1, -E4 limit switches



LIMIT SWITCH FORM	DIMENSION A
CR9441-E2,-E5	3 1/16"
CR9441-E3,-E6	3"

Fig. 5. Outline drawing of CR9441-E2, -E3, -E5 -E6 limit switches

TABLE I

Switch Unit D-c Interruption Ratings

CR9441-E1, -E2, -E3 Only

		125 v	250 v	600 v
Single-circuit	Inductive Amp	0.50	0.25	0.14
	Noninductive Amp	1.00	0.40	0.23
Two-circuit	Inductive Amp	0.30	0.15	0.07
	Noninductive Amp	0.60	0.30	0.18

TABLE II

Switch Unit A-c Interruption Ratings

		115 v	230 v	600 v
Single-circuit	Inductive Amp	25	25	7.5
	Noninductive Amp	25	25	7.5
Two-circuit	Inductive Amp	25	25	3.0
	Noninductive Amp	25	25	3.0

TABLE III

CR9441 Form	Turns of Driving Shaft			
	Max	Min	To Reset	Ov tra
E1A–E1D, E2A, and E3A	120	4	2½	
E1F	30	1	⅝	
E4A–E4D E5A, and E6A	120	4	¼	
E4F, E5F	30	1	⅛	

GENERAL PURPOSE CONTROL DEPARTMENT

GENERAL ELECTRI

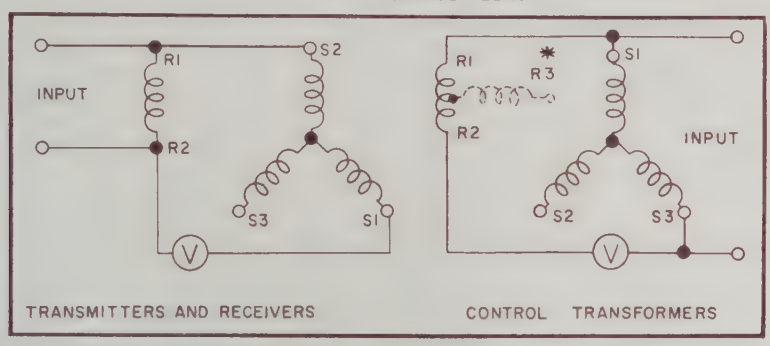
BLOOMINGTON, ILLINOIS

SYNCHRO ELECTRICAL ZERO

The electrical zero of a synchro is defined as that position of the rotor, with respect to the stator, where the voltage between S1 and S3 is zero and where the voltage from S2 to S1 is in phase with the voltage from R1 to R2.

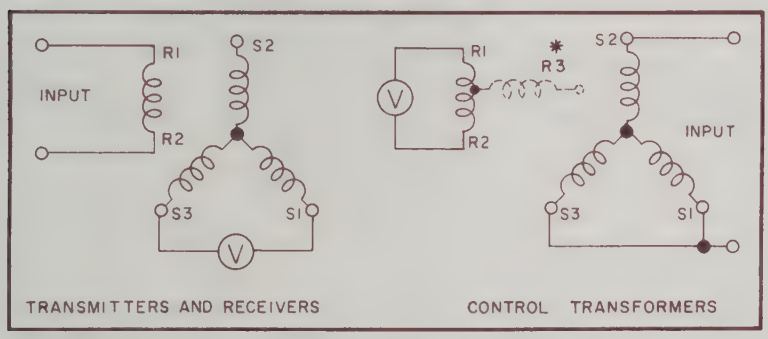
There are two null positions for any synchro. For the correct null, connect the synchro to a voltage source and voltmeter as shown in (A) below; then turn the rotor to determine coarse zero. As the rotor is turned, one null point near the correct electrical zero will be found. To determine the fine electrical zero, connect the synchro as shown in (B) and adjust the rotor slightly until a null is established. This is the exact electrical zero.

(A) COARSE ZERO



*WHEN CDX IS USED AS CT IN S-A TWO-SPEED SYNCHRO PEDESTAL SYSTEMS.

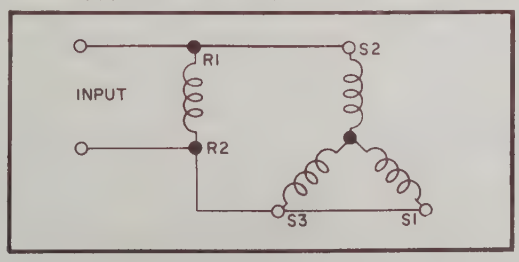
(B) FINE ZERO

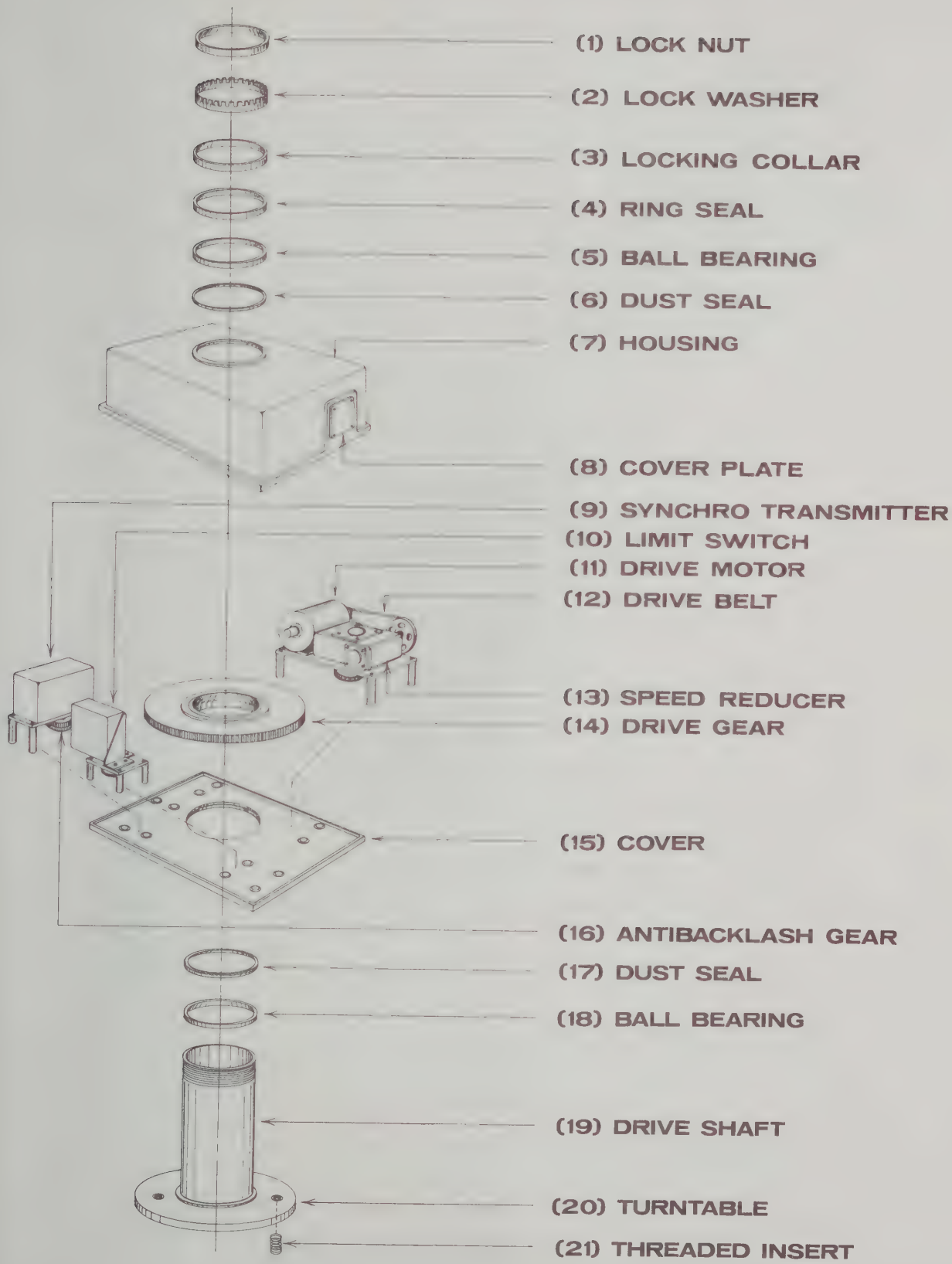


*WHEN CDX IS USED AS CT IN S-A TWO-SPEED SYNCHRO PEDESTAL SYSTEMS.

To zero a synchro receiver when its shaft can rotate freely (as in a position indicator), remove all leads from the synchro and reconnect them as shown in (C). The synchro shaft will turn to the electrical zero position when rotor voltage is applied. Do not leave the synchro connected in this manner for more than two minutes, because the synchro will overheat.

(C) RECEIVER ZERO BY ELECTRICAL LOCK





Exploded View of a Typical Polarization Positioner

SECTION 5
PARTS LIST

MANUFACTURERS' CODE LETTERS

Corrections may have been made to this manual by hand and/or an Instruction Manual Change Notice sheet may be inserted immediately following the frontispiece to reflect any changes to the equipment made after the printing of the manual.

When ordering parts from Scientific-Atlanta be sure to include the equipment model, serial number, and a description of the part.

Code	Manufacturer
ABE	Amphenol-Borg
BE	Bodine Electric
BG	Boston Gear Works
CT	A. W. Chesterton
DIX	Dixie Packing
ED	Eberhardt-Denver
FB	Fafnir
GE	General Electric
HCC	Heli-Coil
K	Kaydon
ND	New Departure
SA	Scientific-Atlanta
SEC	Spectrol Electronics
SU	Superior Electric
US	United States Rubber
WK	Waldes-Kohinoor (TRUARC)

PARTS LIST

MODEL 5601
POLARIZATION POSITIONER

Component Designation	Description	Mfr.*	Mfr. Part No.
5	Ball bearing	FB	KP-37-B
7	Housing and plate	SA	PP1-DM-9061
9	Synchro transmitter (1:1 only)	SA	PX1-B
11	Drive motor	SU	SS150-P2
14	Drive gear	SA	PP1-BM-8972
16	Antibacklash gear	SA	PP1-CM-13703
18	Ball bearing	FB	KP-47-B
19	Drive shaft	SA	PP1-CM-9125
**	Retaining ring (outer)	WK	5002-387
**	Retaining ring (inner)	WK	5102-293
**C 1	Capacitor, fixed, 3.3 μf, 330v	SU	DP16173-G2
**	Connector, receptacle, male, 22 pins	ABE	AN3102A-28-11P
**R 1	Resistor, fixed, wirewound, 250 ohms ±5%, 25w	SU	BP262-G13

*See "MANUFACTURERS' CODE LETTERS."
**Not shown on exploded view.

PARTS LIST

MODEL 5611

POLARIZATION POSITIONER

Component Designation	Description	Mfr.*	Mfr. Part No.
1	Lock nut	SA	PP-MB-1626
2	Locking collar	SA	PP-MB-1621
5	Ball bearing	K	KB-42-CP
6	Dust seal	CT	Style 500-5/16
7	Housing	SA	PP11-MC-3892
15	Cover	SA	PP11-MC-3891
17	Dust seal	CT	Style 500-5/16
18	Ball bearing	K	KB42-CP
19	Drive shaft	SA	PP11-MC-3890
21	Threaded insert	HCC	1185-6CN x 9/16
**	Detent ring	SA	PP11-MC-3893
**	Lock-down screw (3/8-16)	SA	PP11-MA-5139

*See "MANUFACTURERS' CODE LETTERS."
**Not shown on exploded view.

PARTS LIST

MODEL 5612

POLARIZATION POSITIONER

Component Designation	Description	Mfr.*	Mfr. Part No.
1	Lock nut	SA	PP-MB-1626
3	Locking collar	SA	PP-MB-1621
5	Ball bearing	K	KB-42-CP
6	Dust seal	CT	Style 500-5/16
7	Housing	SA	PP-MC-2234D
10	Limit switch	GE	CR9441-E1F
11	Drive motor	SEC	SS150-RC
12	Drive Chain	BG	No. 25-1/4P-54 and 73 link
13	Speed reducer	ED	17LV-1-RD (13.1:1)
14	Drive gear	SA	PP-MB-1613
15	Cover	SA	PP-MC-3576
17	Dust seal	CT	Style 500-5/16
18	Ball bearing	K	KB-42-CP
19	Drive shaft	SA	PP-MC-1616B
21	Threaded insert	HCC	1185-6CN x 9/16
**	Connector, receptacle, male, 8 pins	ABE	MS3102A-20-7P

*See "MANUFACTURERS' CODE LETTERS."
**Not shown on exploded view.

PARTS LIST

MODEL 5613
POLARIZATION POSITIONER

Component Designation	Description	Mfr.*	Mfr. Part No.
1	Lock nut	SA	PP-MB-1626
3	Locking collar	SA	PP-MB-1521
5	Ball bearing	K	KB-42-CP
6	Dust seal	CT	Style 500-5/16
7	Housing	SA	PP-MC-2234
9	Synchro transmitter	SA ratio 1:1 36:1 1:1 and 36:1	 PX1-X12 PX1-X24 PX1-X2
10	Limit switch	GE	CR9441-EJA
11	Drive motor	BE	B2410 1/15 hp
12	Drive belt	US	190XL037
13	Speed reducer	ED	17LV-1-RD(45:1)
14	Drive gear	SA	PP-MB-1613
15	Cover	SA	PP-MC-3576
16	Antibacklash gear	SA	STD-MB-2156
17	Dust seal	CT	Style 500-5/16
18	Ball bearing	K	KB-42-CP
19	Drive shaft	SA	PP-MC-1616
21	Threaded insert	HCC	1185-6CN x 9/16
**	Connector, receptacle, male, 22 pins	ABE	MS3102A-28-11P(W)

*See "MANUFACTURERS' CODE LETTERS."
**Not shown on exploded view.

PARTS LIST

MODEL 5621
POLARIZATION POSITIONER

Component Designation	Description	Mfr.*	Mfr. Part No.
1	Lock nut	ND	AN-30
2	Lock washer	ND	W-30
4	Ring seal	SA	PP23-MB-5226
5	Ball bearing	K	KC-60-CP
6	Dust seal	DIX	5/16 x 25 braided asbestos
7	Housing	SA	PP21-MD-6757
15	Cover	SA	PP21-MD-6749
17	Dust seal	DIX	5/16 x 25 braided asbestos
18	Ball bearing	K	KC-60-CP
19	Drive shaft	SA	PP21-MD-6754
21	Threaded insert (inner circle)	HCC	1185-6CN x 3/8
21	Threaded insert (outer circle)	HCC	1185-8CN x 1/2
**	Lock-down screw	SA	PP21-MA-6752

*See "MANUFACTURERS' CODE LETTERS."
**Not shown on exploded view.

PARTS LIST

MODEL 5622
POLARIZATION POSITIONER

Component Designation	Description	Mfr.*	Mfr. Part No.
1	Lock nut	ND	AN-30
2	Lock washer	ND	W-30
4	Ring seal	SA	PP23-MB-5226
5	Ball bearing	K	KC-60-CP
6	Dust seal	DIX	5/16 x 25 braided asbestos
7	Housing	SA	PP23-MD-5222
10	Limit switch	GE	CR9441-E1F
11	Drive motor	SU	SS250 RC
12	Drive belt	US	260XL037
13	Speed reducer	ED	21LV-1-RD(7.67:1)
14	Drive gear	SA	PP23-MC-5219
15	Cover	SA	PP23-MD-5223B
17	Dust seal	DIX	5/16 x 25 braided asbestos
18	Ball bearing	K	KC-60-CP
19	Drive shaft	SA	PP23-MC-5224D
21	Threaded insert (inner circle)	HCC	1185-6CN x 3/8
21	Threaded insert (outer circle)	HCC	1185-8CN x 1/2
**	Connector, receptacle, male, 8 pins	ABE	MS3102A-20-7P
**C1	Capacitor, fixed, oil-filled, 6.5 μf ±6%, 330v	SU	DP16173-G2
**R1	Resistor, fixed, wirewound, 150 ohms ±5%, 50w	SU	R-SS250/250/400

*See "MANUFACTURERS' CODE LETTERS."
**Not shown on exploded view.

PARTS LIST

MODEL 5623
POLARIZATION POSITIONER

Component Designation	Description	Mfr.*	Mfr. Part No.
1	Lock nut	ND	AN-30
2	Lock washer	ND	W-30
4	Ring seal	SA	PP23-MB-5226
5	Ball bearing	K	KC-60-CP
6	Dust seal	DIX	5/16 x 25 braided asbestos
7	Housing	SA	PP23-MD-5222
9	Synchro transmitter	SA ratio 1:1 36:1 1:1 and 36:1	 PX1-B PX1-C PX1-A
10	Limit switch	GE	CR9441-E1F
11	Drive motor	GE	5BC 46 AB408
12	Drive belt	US	260XL037
13	Speed reducer	ED	21LV-1-RD(66:1)
14	Drive gear	SA	PP23-MC-5219
15	Cover	SA	PP23-MC-5223
16	Antibacklash gear	SA	STD-MB-5221
17	Dust seal	DIX	5/16 x 25 braided asbestos
18	Ball bearing	K	KC-60-CP
19	Drive shaft	SA	PP23-MC-5224D
21	Threaded insert (inner circle)	HCC	1185-6CN x 3/8
21	Threaded insert (outer circle)	HCC	1185-8CN x 1/2
**	Connector, receptacle, male, 22 pins	ABE	MS3102A-28-11P(W)

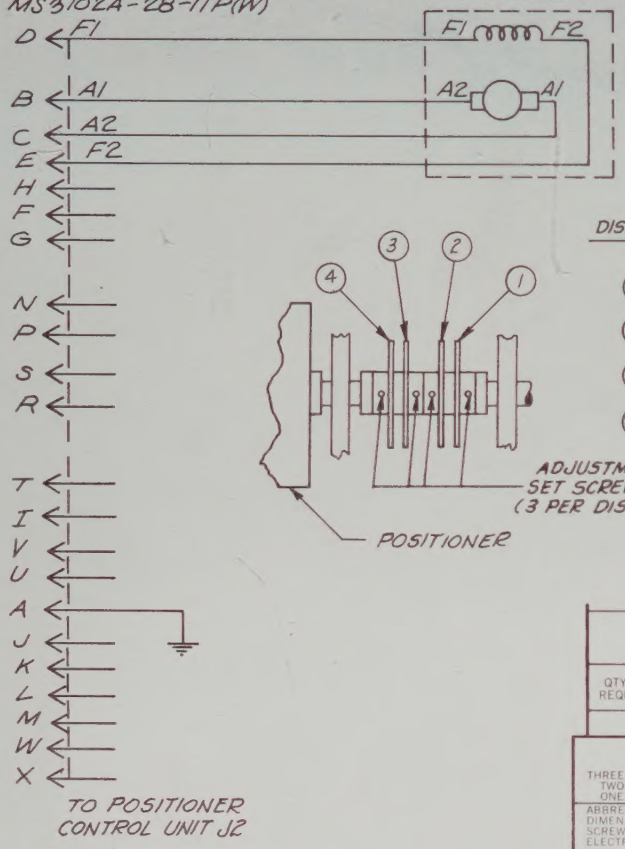
*See "MANUFACTURERS' CODE LETTERS."
**Not shown on exploded view.

APPLICATION		
QTY REQD	NEXT ASSY	USED ON
		P.O. 0273

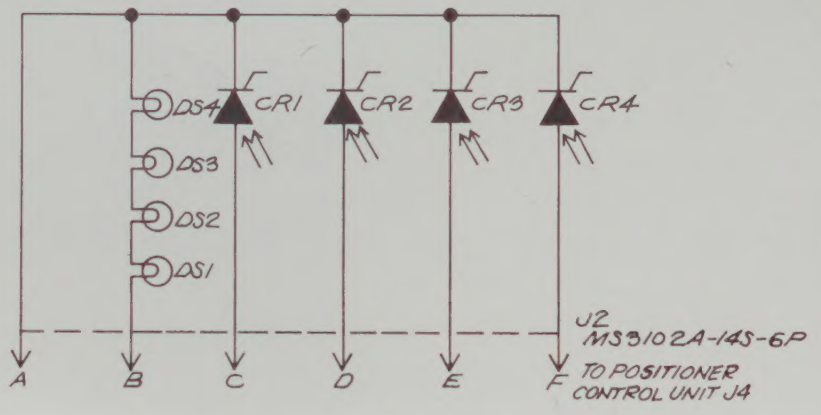
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED

J1
MOTORS & SYNCHROS
MS3102A-28-11P(W)

B1 *
DC MOTOR



DISC #	SCR #
1	CR1
2	CR2
3	CR3
4	CR4



NOTE: CR1 THRU 4 G.E. L8F OR L9F
LIGHTS DS1 THRU DS4 G.E. 253

QTY REQD	ITEM NO.	IDENTIFYING OR PART NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL	STOCK SIZE	MATL SPEC	CODE IDENT

LIST OF MATERIALS OR PARTS LIST

ALL DIMENSIONS ARE IN INCHES
UNLESS OTHERWISE SPECIFIED
TOLERANCES
THREE PLACES ± .005 FRACTIONS
TWO PLACES ± .015
ONE PLACE ± ANGLES ± 0° 30'

ABBREVIATIONS PER MIL-STD-12
DIMENSIONS PER MIL-STD-8
SCREW THREADS PER NBS H28 & MIL-STD-9
ELECTRICAL & ELECTRONIC SYMBOLS PER MIL-STD-15
REFERENCE DESIGNATIONS PER MIL-STD-16

SURFACE ROUGHNESS ✓ PER MIL-STD-10
ALL RESISTORS IN OHMS, K, AND M WATT UNLESS OTHERWISE SPECIFIED

ALL CAPACITORS IN MICROFARADS UNLESS OTHERWISE SPECIFIED

LAST REFERENCE DESIGNATION USED
C ____ CR ____ J ____ K ____
Q ____ R ____ S ____

BREAK SHARP EDGES & CORNERS .005 to .015R

FINISH

		DATE
DR BY	A. Scales	8-29-67
ENGR	M.P.F.	8-30-67
CHK		
MATL		
PROJ		
PROD		
APPD		
APPD		
APPD		

SCIENTIFIC-ATLANTA, INC.
3845 PLEASANTDALE RD., DORAVILLE, GA. BOX 13654, ATLANTA, GA. 30324

SCHEMATIC DIAGRAM MEDIUM DUTY POSITIONER MODEL 5613R/J2-4

CODE IDENT NO.	SIZE	DRAWING NO.
10110	B	52152
SCALE		SHEET

CONVERSION OF VOLTAGE AND POWER RATIOS TO DECIBELS

basic chart below indicates the number of decibels (db) esponding to the listed ratios of voltage or power over the ge of −20 to +20 db. For voltage or power ratios greater than se included in the chart, the ratio can be broken down into a duct of two numbers, the value in db for each found separately, the two results added. Example: To convert a power ratio of 2,000:1 to db, express 2,000 as 2×10^3; the number of db corresponding to a power ratio of 2 is very nearly 3, and the number of db for a power ratio of 10^3 is 30. Therefore, the power ratio of 2,000:1 is approximately 30 db + 3 db = 33 db. In the lower right-hand corner of the chart db values for voltage and power ratios of integral powers of 10 are given.

Voltage Ratio	Power Ratio	−db+	Voltage Ratio	Power Ratio	Voltage Ratio	Power Ratio	−db+	Voltage Ratio	Power Ratio	Voltage Ratio	Power Ratio	−db+	Voltage Ratio	Power Ratio
1.000	1.000	0	1.000	1.000	.447	.200	7.0	2.239	5.012	.200	.0398	14.0	5.012	25.12
.989	.977	.1	1.012	1.023	.442	.195	7.1	2.265	5.129	.197	.0389	14.1	5.070	25.70
.977	.955	.2	1.023	1.047	.437	.191	7.2	2.291	5.248	.195	.0380	14.2	5.129	26.30
.966	.933	.3	1.035	1.072	.432	.186	7.3	2.317	5.370	.193	.0372	14.3	5.188	26.92
.955	.912	.4	1.047	1.096	.427	.182	7.4	2.344	5.495	.191	.0363	14.4	5.248	27.54
.944	.891	.5	1.059	1.122	.422	.178	7.5	2.371	5.623	.188	.0355	14.5	5.309	28.18
.933	.871	.6	1.072	1.148	.417	.174	7.6	2.399	5.754	.186	.0347	14.6	5.370	28.84
.923	.851	.7	1.084	1.175	.412	.170	7.7	2.427	5.888	.184	.0339	14.7	5.433	29.51
.912	.832	.8	1.096	1.202	.407	.166	7.8	2.455	6.026	.182	.0331	14.8	5.495	30.20
.902	.813	.9	1.109	1.230	.403	.162	7.9	2.483	6.166	.180	.0324	14.9	5.559	30.90
.891	.794	1.0	1.122	1.259	.398	.159	8.0	2.512	6.310	.178	.0316	15.0	5.623	31.62
.881	.776	1.1	1.135	1.288	.394	.155	8.1	2.541	6.457	.176	.0309	15.1	5.689	32.36
.871	.759	1.2	1.148	1.318	.389	.151	8.2	2.570	6.607	.174	.0302	15.2	5.754	33.11
.861	.741	1.3	1.161	1.349	.385	.148	8.3	2.600	6.761	.172	.0295	15.3	5.821	33.88
.851	.724	1.4	1.175	1.380	.380	.145	8.4	2.630	6.918	.170	.0288	15.4	5.888	34.67
.841	.708	1.5	1.189	1.413	.376	.141	8.5	2.661	7.079	.168	.0282	15.5	5.957	35.48
.832	.692	1.6	1.202	1.445	.372	.138	8.6	2.692	7.244	.166	.0275	15.6	6.026	36.31
.822	.676	1.7	1.216	1.479	.367	.135	8.7	2.723	7.413	.164	.0269	15.7	6.095	37.15
.813	.661	1.8	1.230	1.514	.363	.132	8.8	2.754	7.586	.162	.0263	15.8	6.166	38.02
.804	.646	1.9	1.245	1.549	.359	.129	8.9	2.786	7.762	.160	.0257	15.9	6.237	38.90
.794	.631	2.0	1.259	1.585	.355	.126	9.0	2.818	7.943	.159	.0251	16.0	6.310	39.81
.785	.617	2.1	1.274	1.622	.351	.123	9.1	2.851	8.128	.157	.0246	16.1	6.383	40.74
.776	.603	2.2	1.288	1.660	.347	.120	9.2	2.884	8.318	.155	.0240	16.2	6.457	41.69
.767	.589	2.3	1.303	1.698	.343	.118	9.3	2.917	8.511	.153	.0234	16.3	6.531	42.66
.759	.575	2.4	1.318	1.738	.339	.115	9.4	2.951	8.710	.151	.0229	16.4	6.607	43.65
.750	.562	2.5	1.334	1.778	.335	.112	9.5	2.985	8.913	.150	.0224	16.5	6.683	44.67
.741	.550	2.6	1.349	1.820	.331	.110	9.6	3.020	9.120	.148	.0219	16.6	6.761	45.71
.733	.537	2.7	1.365	1.862	.327	.107	9.7	3.055	9.333	.146	.0214	16.7	6.839	46.77
.724	.525	2.8	1.380	1.905	.324	.105	9.8	3.090	9.550	.145	.0209	16.8	6.918	47.86
.716	.513	2.9	1.396	1.950	.320	.102	9.9	3.126	9.772	.143	.0204	16.9	6.998	48.98
.708	.501	3.0	1.413	1.995	.316	.100	10.0	3.162	10.000	.141	.0200	17.0	7.079	50.12
.700	.490	3.1	1.429	2.042	.313	.0977	10.1	3.199	10.23	.140	.0195	17.1	7.161	51.29
.692	.479	3.2	1.445	2.089	.309	.0955	10.2	3.236	10.47	.138	.0191	17.2	7.244	52.48
.684	.468	3.3	1.462	2.138	.306	.0933	10.3	3.273	10.72	.137	.0186	17.3	7.328	53.70
.676	.457	3.4	1.479	2.188	.302	.0912	10.4	3.311	10.96	.135	.0182	17.4	7.413	54.95
.668	.447	3.5	1.496	2.239	.299	.0891	10.5	3.350	11.22	.133	.0178	17.5	7.499	56.23
.661	.437	3.6	1.514	2.291	.295	.0871	10.6	3.388	11.48	.132	.0174	17.6	7.586	57.54
.653	.427	3.7	1.531	2.344	.292	.0851	10.7	3.428	11.75	.130	.0170	17.7	7.674	58.88
.646	.417	3.8	1.549	2.399	.288	.0832	10.8	3.467	12.02	.129	.0166	17.8	7.762	60.26
.638	.407	3.9	1.567	2.455	.285	.0813	10.9	3.508	12.30	.127	.0162	17.9	7.852	61.66
.631	.398	4.0	1.585	2.512	.282	.0794	11.0	3.548	12.59	.126	.0159	18.0	7.943	63.10
.624	.389	4.1	1.603	2.570	.279	.0776	11.1	3.589	12.88	.125	.0155	18.1	8.035	64.57
.617	.380	4.2	1.622	2.630	.275	.0759	11.2	3.631	13.18	.123	.0151	18.2	8.128	66.07
.610	.372	4.3	1.641	2.692	.272	.0741	11.3	3.673	13.49	.122	.0148	18.3	8.222	67.61
.603	.363	4.4	1.660	2.754	.269	.0724	11.4	3.715	13.80	.120	.0145	18.4	8.318	69.18
.596	.355	4.5	1.679	2.818	.266	.0708	11.5	3.758	14.13	.119	.0141	18.5	8.414	70.79
.589	.347	4.6	1.698	2.884	.263	.0692	11.6	3.802	14.45	.118	.0138	18.6	8.511	72.44
.582	.339	4.7	1.718	2.951	.260	.0676	11.7	3.846	14.79	.116	.0135	18.7	8.610	74.13
.575	.331	4.8	1.738	3.020	.257	.0661	11.8	3.890	15.14	.115	.0132	18.8	8.710	75.86
.569	.324	4.9	1.758	3.090	.254	.0646	11.9	3.936	15.49	.114	.0129	18.9	8.811	77.62
.562	.316	5.0	1.778	3.162	.251	.0631	12.0	3.981	15.85	.112	.0126	19.0	8.913	79.43
.556	.309	5.1	1.799	3.236	.248	.0617	12.1	4.027	16.22	.111	.0123	19.1	9.016	81.28
.550	.302	5.2	1.820	3.311	.246	.0603	12.2	4.074	16.60	.110	.0120	19.2	9.120	83.18
.543	.295	5.3	1.841	3.388	.243	.0589	12.3	4.121	16.98	.108	.0118	19.3	9.226	85.11
.537	.288	5.4	1.862	3.467	.240	.0575	12.4	4.169	17.38	.107	.0115	19.4	9.333	87.10
.531	.282	5.5	1.884	3.548	.237	.0562	12.5	4.217	17.78	.106	.0112	19.5	9.441	89.13
.525	.275	5.6	1.905	3.631	.234	.0550	12.6	4.266	18.20	.105	.0110	19.6	9.550	91.20
.519	.269	5.7	1.928	3.715	.232	.0537	12.7	4.315	18.62	.104	.0107	19.7	9.661	93.33
.513	.263	5.8	1.950	3.802	.229	.0525	12.8	4.365	19.05	.102	.0105	19.8	9.772	95.50
.507	.257	5.9	1.972	3.890	.227	.0513	12.9	4.416	19.50	.101	.0102	19.9	9.886	97.72
.501	.251	6.0	1.995	3.981	.224	.0501	13.0	4.467	19.95	.100	.0100	20.0	10.000	100.00
.496	.246	6.1	2.018	4.074	.221	.0490	13.1	4.519	20.42		10^{-3}	30		10^3
.490	.240	6.2	2.042	4.169	.219	.0479	13.2	4.571	20.89	10^{-2}	10^{-4}	40	10^2	10^4
.484	.234	6.3	2.065	4.266	.216	.0468	13.3	4.624	21.38		10^{-5}	50		10^5
.479	.229	6.4	2.089	4.365	.214	.0457	13.4	4.677	21.88	10^{-3}	10^{-6}	60	10^3	10^6
.473	.224	6.5	2.113	4.467	.211	.0447	13.5	4.732	22.39		10^{-7}	70		10^7
.468	.219	6.6	2.138	4.571	.209	.0437	13.6	4.786	22.91	10^{-4}	10^{-8}	80	10^4	10^8
.462	.214	6.7	2.163	4.677	.207	.0427	13.7	4.842	23.44		10^{-9}	90		10^9
.457	.209	6.8	2.188	4.786	.204	.0417	13.8	4.898	23.99	10^{-5}	10^{-10}	100	10^5	10^{10}
.452	.204	6.9	2.213	4.898	.202	.0407	13.9	4.955	24.55		10^{-11}	110		10^{11}
										10^{-6}	10^{-12}	120	10^6	10^{12}

SCIENTIFIC-ATLANTA, INC.

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